

Serial No. 10/080,114  
Amendment Dated 06/02/2005  
Reply to Office Action of 01/28/2005

### **REMARKS/ARGUMENTS**

Claims 1-11 and 13-21 are pending in the application. Claims 15 and 19 are cancelled. The subject matter of dependent claims 15 and 19 are incorporated into independent claims 13 and 17.

Claims 1, 2, 8, 11, 13, and 17 have been amended. Support for the amendments to the above-referenced claims can be found in the original claims and on page 22, lines 15-18 of the specification as originally filed. No new matter has been added by way of amendment. Applicants respectfully request reconsideration of the claims in view of the following remarks.

### **DETAILED ACTION**

#### **Sequence Listing**

The Office Action states: "The sequences of Figures 8 and 9 have not been identified by SEQ ID NO: under the 'Brief Description of the Drawing' on page 9 of the specification.... Appropriate correction is required."

The specification has been amended on page 9 to identify the SEQ ID NOs disclosed in the Figures. It is believed the amendment obviates the rejection.

#### **Claim Rejections - 35 USC §112, second paragraph**

Claims 1-11 and 13-21 are rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 2, 8, 13, and 17 have been amended. Claims 15 and 19 have been cancelled.

The Office Action states: Claim 1 is indefinite because "...a polynucleotide that is complementary to SEQ ID NO:1 or 11 cannot encode a sucrose synthase."

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Claim 1 has been amended to delete reference to "a polynucleotide which is complementary to a polynucleotide of (a), (b), or (c)". It is believed the amendment obviates the rejection.

The Office Action states: Claim 2 is indefinite because "...a polynucleotide that is antisense to SEQ ID NO:1 or 11 cannot encode a sucrose synthase."

Claim 2 has been amended to delete reference to "...sense or anti-sense orientation". It is believed the amendment obviates the rejection.

The Office Action states: "Claim 11 is indefinite because in part (c), the claim recites 'at least one polypeptide encoded by a polynucleotide of claim 1'. Part (d) of claim 1 cannot encode a polypeptide.

Claim 1 has been amended to delete reference to "a polynucleotide which is complementary to a polynucleotide of (a), (b), or (c)" (part d). It is believed the amendment obviates the rejection.

The Office Action states: "Claim 11 is also indefinite in the recitation of 'using GAP' without any active, positive steps delimiting how this use is actually practiced....It is suggested that 'using' be replaced with --by--, as in claim 1."

Claim 11 has been amended as suggested in the Office Action. It is believed the amendment obviates the rejection.

#### **Claim Rejections - 35 USC §112, first paragraph**

Claims 1-11 and 13-21 are rejected under 35 USC §112, first paragraph, because the specification, does not reasonably provide enablement for an isolated polynucleotide that is complementary to SEQ ID NO: 1 or 11 and encoding a polypeptide having sucrose synthase activity, antisense of all polynucleotides encoding SEQ ID NO: 2 or 12, transgenic plants comprising said polynucleotides and a method of expressing any polynucleotide encoding a polypeptide having sucrose synthase activity in a transgenic plant for an increase in cellulose production/concentration in the stalk and in the seed tissues of a transgenic plant.

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The Office Action states: "...claims broadly drawn to a method for increasing concentration of cellulose synthase in a transgenic plant/stalk/seed by transforming the plant with any polynucleotide encoding a sucrose synthase recombinant expression cassette comprising antisense of all polynucleotides encoding SEQ ID NO: 2 or 12 are not supported by an enabling disclosure...."

The Office Action further states: "The instant specification fails to provide guidance with respect to the ability of any sucrose synthase encoding polynucleotide to alter cellulose concentration in specific plant tissues."

The Office Action concludes: "Therefore, given the breadth of the claims....the claimed invention is not enabled throughout the broad scope."

Claims 1, 2, 8, 11, 13, and 17 have been amended. Claims 15 and 19 are cancelled. The subject matter of dependent claims 15 and 19 are incorporated into independent claims 13 and 17.

Claim 2 has been amended to remove reference to "sense or anti-sense orientation".

Claims 13 and 17 have been amended to include a Markush group of the sucrose synthases: "...selected from the group consisting of: a polynucleotide of claim 1, *Sus1* from maize, or *Sh1* from maize". The amendment is supported by the original claims as filed as the Markush group was originally found in dependent claims 15 and 19. It is believed the amendments obviate the rejections and place the claims in condition for allowance.

#### **Claim Rejections - 35 USC §101**

Claim 8 is rejected under 35 USC 101 as claiming non-statutory subject matter.

The Office Action states: "The claim does not read 'transformed' or 'transgenic'.... If the seed does not contain the transgene, then the claim will read

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on the product of nature. It is suggested that the claim is amended to read –  
Transgenic seed—."

Claim 8 has been amended to incorporate the suggestion. Support for the amendment is found in the specification on page 22, lines 15-18. It is believed the amendment obviates the rejection.

#### **Claim Rejections - 35 USC §102**

Claims 13, 16-17, and 20 are rejected under 35 USC §102(b) as being anticipated by Hesse et al (US Pat. No. 5,866,790).

The Office Action states: "Hesse *et al* teach transforming plant cells with a DNA construct comprising a nucleic acid sequence encoding a sucrose synthase gene operably linked (in sense or antisense orientation to a promoter that directs expression in seed or stem tissues, and transformed plants expressing said polynucleotide regenerated from the transformed plant cells...".

Claims 13 and 17 have been amended to include a Markush group of the sucrose synthases: "...selected from the group consisting of: a polynucleotide of claim 1, *Sus1* from maize, or *Sh1* from maize". Claims 16 and 20 depend from claims 13 and 17.

Hesse *et al* teaches only a sucrose synthase from sugar beet. Hesse does not teach or suggest a polynucleotide of claim 1, *Sus1* from maize, or *Sh1* from maize. Thus Claims 13, 16, 17, and 20 are not anticipated by Hesse *et al*.

#### **Claim Rejections - 35 USC §103**

Claims 13-21 are rejected under 35 USC 103(a) as unpatentable over Barry *et al* (US Pat. No. 5,716,837) in view of Fu *et al* (The Plant Cell, Vol 7, pp. 1369-1385, 1995).

The Office Action states: "Barry *et al* teach transformation of a plant with a heterologous DNA encoding sucrose phosphorylase for increased level of starch in

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specific tissues ... the cited reference suggest that gene encoding other enzymes involved in starch synthesis can also be used for plant transformation...."

The Office Action continues: "*Fu et al* teach that genes encoding sucrose synthase from plants are known in the prior art and used for plant transformation. The cited reference teaches *Sus1* and *Sus2* of maize, *Sus3* and *Sus4* of potato, and suggests transformation of plants with said genes.... Therefore it would have been obvious to one of ordinary skill in the art at the time the application was filed to use the method of transforming a plant with a DNA encoding a sucrose biosynthetic enzyme for increased level of sucrose or starch as taught by *Barry et al* and to modify that method by incorporating any one of the known sucrose biosynthesis enzyme encoding DNA including sucrose synthase genes known in the prior art as taught by *Fu et al* with a reasonable expectation of success."

The Office Action concludes: "...Applicant's unexpected result, namely the isolated DNA encoding SEQ ID NO: 2 or 12, transgenic plant comprising it, and a method of using said polynucleotide are not commensurate with any polynucleotide encoding sucrose synthase or methods of its use."

Claims 13 and 17 have been amended. Claims 15 and 19 have been cancelled.

*Barry et al* teach transformation of horticultural and crop plants with sucrose phosphorylase from *S. mutans* to alter polysaccharide content, increase solids content, improve uniformity of the distribution of solids, and modify carbohydrate content. Nowhere does *Barry* teach or suggest using the polynucleotides of the presently claimed invention. Nowhere does *Barry* teach or suggest transforming plants to alter cellulose concentration or production as in present claims 13 and 17.

The teaching of *Barry et al* shows no recognition of, or pertinence to, the problem addressed by the present invention. Therefore, one skilled in the art would not be likely to use such reference, alone or in combination with another reference, in an attempt to solve the problem of modifying cellulose in a plant.

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*Fu et al* teach expression patterns and sequence analysis of newly discovered sucrose synthase genes in potato. *Fu* does not teach or suggest using maize sucrose synthase genes for transformation into plants. *Fu* does not teach or suggest the use of any sucrose synthase genes for altering cellulose in plants. In fact *Fu et al* teach away from the use of sucrose synthase genes for altering cellulose by repeatedly associating sucrose synthase gene function with "supplying energy for loading and unloading in phloem by providing substrate for respiration" (See *Fu et al.*, page 1369, column 1; page 1381, column 1; 1381, paragraph bridging columns 1 and 2; 1382, column 1 and column 2) and for starch synthesis (*Fu et al. seq.*, page 1380, column 2; page 1381, column 1).

It should be noted that it is clear that in order to establish a background for finding obviousness under 35 U.S.C. § 103 that the determination of the scope and contents of the prior art cannot be performed by the mere gathering of elements from separate and distinct disclosures irrespective of the teachings of the disclosures. There must be a reason apparent at the time the invention was made to select the particular combination or the references or the use of such teachings as evidence of obviousness will entail prohibited hindsight. In re Nomiya, 184 U.S.P.Q. 607 (CCPA 1975).

The combination of references neither teaches, nor renders obvious, the methods of present independent claims 13 and 17. Accordingly claims 13-21 are not obvious in view of the cited references.

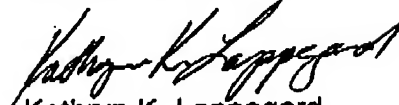
### CONCLUSION

In conclusion, Applicants submit in light of the above amendments and remarks, the current claims are in a condition for allowance, and reconsideration is respectfully requested. If it is felt that it would aid in prosecution, the Examiner is invited to contact the undersigned at the number indicated to discuss any outstanding issues.

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Reconsideration and allowance is respectfully requested.

Respectfully submitted,



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